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学术论文

广州亚运城历史展览馆结构设计

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摘要： 广州亚运城历史展览馆采用复杂空间结构,主体结构由中央核心筒剪力墙、外围框架支撑结构、悬挑碗状结构和钢结构屋盖组成。为满足结构抗扭转需要,调整核心筒和框架支撑结构的相对刚度并辅以楼层配重;为提高结构抗震性能,核心筒钢骨混凝土剪力墙两侧设置钢板;为满足基础承载力要求,基础采用预应力管桩,核心筒基础按两种计算模型进行设计:中震仅考虑核心筒基础,大震考虑核心筒及周围若干柱的基础,通过基础梁连接;为满足行人舒适度要求,采用调谐质量阻尼器(TMD)对大悬挑结构端部及其内部螺旋坡道进行减振控制。镂空、钢管圆筒两种鼓形节点能同时满足支撑结构的建筑效果和节点刚度的要求;对可滑动销轴节点的应用背景进行阐述,并提出适合本工程的节点型式。

关键词： 复杂空间结构 悬挑碗状结构 调谐质量阻尼器 抗震性能 舒适度

Design of the Asian Games Historical Exhibition Center in Guangzhou

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Abstract: The structure of the Asian Games Historical Exhibition Center in Guangzhou is complicated space structure with a shear-wall core tube surrounded by frame braced structure and bowl shape structure suspended from the floors.By adjusting relative stiffness between core tube and frame braced structure,and ballasting floor weight,the torsional resistance is assured.The seismic performance is enhanced by installing steel plate along two sides of steel reinforced concrete core tube shear-walls.Core tube foundation design is based on two types of calculation models.Core tube foundation is independently designed in moderate earthquakes,whereas the integral of core tube foundation and frame column foundations connected by foundation beams is considered for strong earthquakes.Foundation bearing capacity of pre-stressed pipe piles are adopted to satisfy the design demands.Pedestrian comfort assessment is made through vibration control by TMD(tuned mass damper)installed under the side of large cantilevered structure and the spiral ramp.'Hollow out' and steel-tube truncated joints meet the requirements of both architectural effects of supporting structure and joint stiffness.Reasons of using sliding lug pin joints suitable to the project are discussed.

Keywords: bowl shape suspension structure TMD seismic performance human comfort

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